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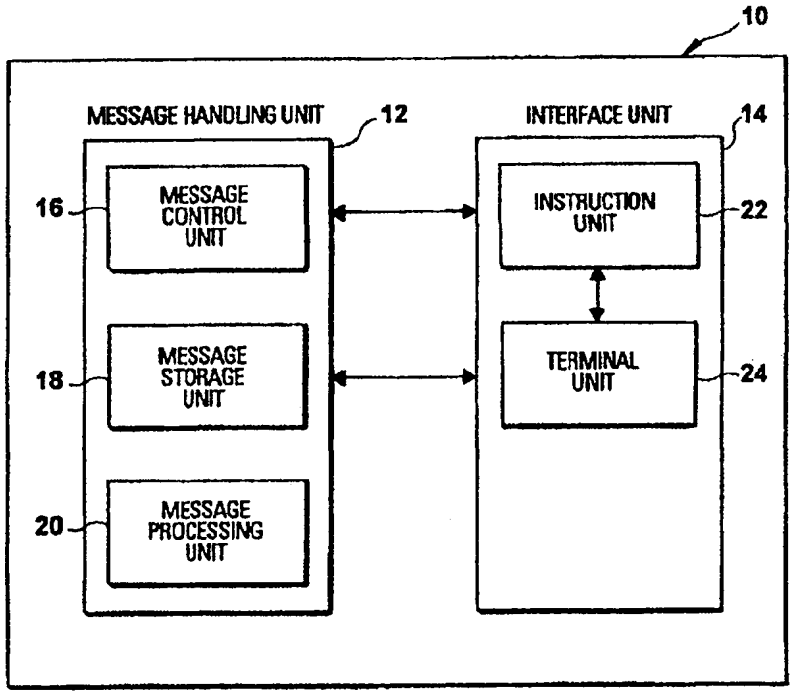
(54) **Title:** COMMUNICATION SYSTEM WITH AUTOMATIC INFORMATION AND MEDIA CONVERSION

(57) **Abstract**

To achieve a media conversion that provides information to several outlets on selective format there is provided a message center with a message handling unit (12) adapted to handle messages transferred to and from the message center (10). Further, interface means (14) receive message instructions via a terminal unit (24) for handling of messages in the message handling unit (12). The message handling unit (12) comprises a conversion unit (42) adapted to execute information/media conversion for messages transmitted to and from the message center, respectively.



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COMMUNICATION SYSTEM WITH AUTOMATIC INFORMATION AND MEDIA CONVERSION

TECHNICAL FIELD OF INVENTION

The present invention relates to information representation in communication systems, and in particular to a mobility support communication system with automatic information and media conversion.

BACKGROUND OF INVENTION

Through the advances of transmission technology, e.g., frame relay, ATM, ISDN, GSM, and the ever decreasing costs for all kinds of terminal equipment fast and productive communication by all kinds of messaging is a rapidly growing market nowadays. Decreased costs for computer equipment have enabled a digital storage of all kinds of message types, i.e. voice mail, fax, e-mail, short message device, and html, respectively. The success and widespread use of fax, answering machines, voice mail and e-mail shows that users are starting to realize the impact of new communication technologies as opposed to direct interactive communication, e.g., video telephony or normal telephony, respectively.

Currently available communication systems mainly support voice communication, electronic mail communication, and facsimile communication, respectively. Typically the communication systems use storage and retrieval facilities

that can be operated on independent platforms and through a plurality of communication channels.

In particular local area network LAN based communication systems have facilitated networking capability for electronic mail. Further, messaging systems are used within single organizations such as companies and there has been almost no effort in support of large scale integrated network functionality to such communication services. Even more important, usually automatic information media conversion between the different communication facilities is not considered due to the operation of facilities on independent hardware and software platforms.

In addition, voice messaging systems usually do not provide integrated network functionality since the terminal equipment is a telephone handling audio signals and dual tone multi-frequency DTMF signals. Addressing methods are short and not adapted to flexible numbering schemes while to the contrary messages are typically large leading to huge amount of data for digitized analog signals.

Finally, existing communication protocols do not provide the functionality to request or specify special services as media translation, subject matter identification, routing and the like.

A further complication in the range of existing communication systems is the increase in number of services and a interrelation therebetween. Existing service managing facilities are usually restricted to pre-specified service formats. Thus, with current systems it is difficult if not impossible to achieve and use effectively a plurality of

services being related to different media and targeted to offer a wide variety of functionality. Within existing communication systems large scale services are complicated to deal with due to the minimal capability of information and media conversion.

Further, besides the actual conversion of information and media currently existing communication systems on a system administration level do not provide functionality to handle and manage the requests and instructions for carrying out the information and media conversion. However, it is this management of information and media conversion traffic in a communication system environment that creates additional concerns with respect to conversion message tracking and management in the communication system. Also, management complexity increases with further establishment of different services with per se may lead to a significantly increased number of information and media conversion requests within communication systems.

The problems generally described above cause deficiencies e.g., in the intelligent network communication system equivalently referred to as universal personal telecommunication UPT system in the following. The system is designed to separate basic services such as set up and supervision of connections and more complex services. As shown in Fig. 11, an intelligent network communication system comprises service switching points SSP, intelligent peripherals IP, service control points SCP, service management systems SMS, and service data points SDP used for migration and change/update of data.

Typically, more complex services are controlled by the service control point SCP being remote from the exchange SSP setting up a connection to a signaling network and being under control of a service managing system SMS. The service switching point SSP makes the required connection and communicates with a related service control point SCP via a signaling network. Further, intelligent peripherals IP are provided to establish specialized functions required for intelligent network services, e.g., digital collection units voice recording systems, hypertext markup language, and short message services SMS.

Usually, in the intelligent network communication system there is provided a combination of supportive telecom services for subscribers having a personal telephone number maintained unchanged. In case a subscriber wishes to call a further subscriber he uses a universal number uniquely assigned to this subscriber. A subscriber may use any intelligent peripheral IP to make or receive calls regardless of which network or peripheral is at his disposal for the moment, e.g., a public switches telephone network PSTN, a business network or a cellular network.

Therefore the subscriber will usually want to have control of incoming calls and identify all kinds of information, e.g., facsimile, email data, etc.. However, while the subscriber is supported by a number of functions to store messages and reroute incoming messages to various alternative numbers according to his time table he usually does not know who sends information to him and when the message was actually send. Further, the format of the incoming message such as speech or data is usually not known before the answer thereto

and therefore no suitable information and media conversion may be executed before receiving a message.

A further typical example for the isolated nature of existing communication systems is the digital cellular communication system GSM illustrated in Fig. 12. Here, a gateway mobile service switching center GMSC serves to achieve a link between different PLMN service areas, i.e. the home public land mobile network HPLMN of a subscriber. Further, a mobile switching center MSC establishes a link to a mobile station MS. In the digital cellular communication system GSM the mobility support is achieved through a home location register HLR and a visitor location register VLR provided to dynamically store information with respect to the roaming mobile stations MS. Here, messages are mainly transferred as voice messages and there may exist difficulties in transferring information to other communication systems due to different protocols used for the transfer and processing of voice messages. Further, while recently extensions with respect to short messages have been introduced in ETSI standard 2.90 to 4.90 with respect to unstructured supplementary data USSD no particular focus was put on information and media conversion either in the mobile station MS or in the mobile switching center MSC.

The same problems as outlined above also arise in virtual private networks VPN, that enable to route traffic over a PSTN network instead of using a private network so that the staff of a customer may form a closed user group within a PSTN network. Usually, such virtual private networks VPN are provided by leasing circuits from a public telecommunication operator in one or more countries. However, most organizations have separate networks for voice and data

traffic where the voice network links the private branch exchanges and a wide area network links the local area networks for data communication. Therefore, also in this case interchangeability of different data formats is highly restricted without dedicated support of information and media conversion. Nevertheless, this will be a prerequisite to establish VPN services as major basis for teleworking.

In conclusion, for the different support mobility communication systems outlined above, currently there is not known a complete solution to the problem of in advance identification of format and sender for different messages such as facsimile, email, data, etc. and the efficient conversion of these messages.

SUMMARY OF INVENTION

Thus, the object of the invention is to provide a message center for information and media conversion for a communication system that provides information to several outlets on selectable formats.

According to a first aspect of the invention this object is achieved through a message center, in particular for use in a mobility support communication system, comprising message handling means adapted to handle messages transferred to and from the message center, respectively, interface means to receive message instructions via a terminal means for the handling of messages in the message handling means, wherein the message handling means comprises conversion means for information/media conversion executed on messages transmitted to and from the message center, respectively.

Therefore, according to the present invention it is possible to get all information in one place from one number to several outlets on selected formats by choice of the message center user. The message center as intelligent periphery within any mobility support communication system may identify the format of incoming traffic, e.g. on facsimile, e-mail data, hypertext markup language html, etc., and then distribute this traffic to different outlets. The user of the inventive message centers knows any time when a message was sent to the message center. Further, information on the message is available and the conversion means allows to get the information outputted in a suitable format.

According to preferred embodiment of the invention, the conversion means comprises a conversion switching means to split the conversion of messages into local conversion and remote conversion executed externally to the message center.

This embodiment allows to distribute conversion intelligently within the communication system where the message center is used. One example would be that a certain message center only carries out a specific subset of conversion tasks, e.g. from speech to text and from speech to facsimile and in case further conversion is necessary which is not supported by this particular message center this conversion would then be carried out through a further message center providing this functionality. Also, this feature allows to allocate complex conversion tasks into a central message center while conversion functionality that may simply be realized may be provided at a plurality of sites in the mobility support communication system.

According to a further preferred embodiment the conversion means comprises at least one conversion kernel means in a modular fashion. Therefore, the functionality of the conversion means in the message center may easily be extended by adding further conversion kernel means to an existing message center, if necessary.

According to a further preferred embodiment of the present invention the message handling means of the message center subdivides into message processing means to classify and modify messages transferred to and from the message center, respectively, message storage means to intermittently store messages in the message handling means, and message control means to control the interaction of the message processing means and the message storage means.

Preferably, the message processing means classifies the messages transmitted to the message center into a first group being directly forwarded to the interface means and a second group being intermittently stored in the message storage means.

Also preferably, the message processing means is adapted to derive information on message format, size, or message sender identification that may be output through the interface means or forwarded to further message centers.

Also, the message processing means may identify the sending time of a message received by the message center and notify the user of the message center of a message received. Therefore, according to the present invention it is possible to notify the user of the message center that a message has been delivered, e.g. using a short message service or a voice

machine message. Since additional information is derived for the messages received, the user of the message center has the chance to receive messages in at least three different ways, i.e. according to message volume, message reception time or message priority. Further, important messages may be forwarded directly to the user of the message center without any undesired delay through message processing.

According to a preferred embodiment of the invention the message processing means is adapted to stop incoming messages in dependence on the message sender identified through the message processing means. Therefore, the user of the message center has the choice to stop incoming messages in dependence on his priorities.

According to a further preferred embodiment, the message storage means in the message center is adapted to store messages in different storage boxes according to the message format. This allows to achieve a better overview of the different messages to be handled by the message center. Further, in case messages of different types are received like voice, facsimile, e-mail, video, etc. the respective storage boxes may be particularly adapted to the respective storage requirements, i.e. according to data volume or access time requirements. Still further, the preselective storage of messages into different storage boxes allows to easily set up a user menu in a systematic way, e.g. through the use of diagrams.

According to a further embodiment of the present invention, messages stored in the storage boxes are assigned an attribute through an attribute assignment means according to the message format therefore. This leads to the further

advantage that these attribute may be used to set up the media table for the user menu and also to sort data/messages according to the user's choice. Further, priorities may be assigned to specify the order of messages. Typical such attributes are arrival time, storage time, i.e. maximum storage time and minimum storage time, sender's address, format, and size respectively. This information may be used, e.g. to sort different messages according to their sending address and split up according to the attributes and priority in the form of a matrix or media table. This matrix may be turned to the user of the message center. One example would be that in case a prespecified number of messages for a certain sender is exceeded the user of the message center is notified of the plurality of received messages and instructed to contact the message center to check on the messages received from this specific sender. As outlined above, this feature also supports the establishment of so-called black lists to stop a sender to enter the message center as soon as he is specified in the blacklist.

According to a further preferred embodiment of the present invention the terminal means of the message center provides voice control means for voice control in order to skip, store, forward or get different messages from the storing means. Preferably, the message instruction is manipulated via phone using DTMF, voice, and WWW, respectively. Here, in case, the user of the message center for the time being only has a terminal with a subset of functionalities, e.g., a mobile station in the GSM network without any graphical display, he may use the available access, e.g., voice, to instruct the message center to carry out conversion tasks in advance before providing the received messages to the user in accordance with the functionality provided through the end

terminal used. Therefore, according to the invention, a major advantage is that a user of the message center may also use simplified and thus more cheaper terminals adapted to the messages formats being used more frequently.

According to yet another preferred embodiment of the present invention, the interface means of the message center outputs a notification according to a message received in the form of a voice machine message. Here, an example would be "you have five voice mails from your boss, send time, etc.". The user then may skip or send voice messages back simply by saying "send to my boss" where the system knows how to send on and what format should be used for the answer.

According to a further preferred embodiment of the present invention, the message center is realized using a computing means adapted to receive external messages and having interface means enabling a set up of a user menu via a display means. Therefore, the user of the computing means may be provided with information via the display means like "you have five e-mails from Mr. A or four voice mails from Mr. B". Also, in case the message is not identified, the user has the choice to add the sending number to a black list in order to avoid to receive any more information therefrom.

Overall, the functionality of the message center is of key importance for users of future mobility support communication systems to get information or messages on his service when all traffic comes to single number. Typically, services may be used in front of a computer or a WWW-page. The functionality will increase the possibility to sell related products and the usefulness of such products for end users. This is of particular importance in view of the fact that

networks operator's revenues depend on the number of users added to a mobility support communication network.

Further, according to the present invention there is provided a service exchange device for mobility support communication system, comprising at least one service control means to control at least one service activated in the mobility support communication system in response to a service request received from a service source node; and at least one service switching means to interface the service control means to the service source node and at least one service target node; wherein information/media conversion processing between the service source node and the service target node is distributed through the service control means to at least one conversion means provided in the mobility support communication system.

Here, the same advantages as outlined above with respect to the message center may be achieved through applying the message center to a mobility support communication system, in particular to a service exchange device provided therein. It is of importance that the present invention is not restricted to a particular kind of mobility support communication system such as the intelligent network communication system or the GSM cellular mobile communication system. To the contrary, it is adaptable to any such communication system wherein communication takes place between a service source node and least one service target node. Also, according to the present invention, the information/media conversion processing may be assigned to different functional units within the mobility support communication system, whichever is most suitable for the particular application. Typical examples are the service control point within the intelligent network communication

system or the mobile service switching center in the cellular digital communication system. Nevertheless, the conversion processing may also be assigned to a server of an internet communication system.

Still further, the conversion processing may also be provided for the internet by providing an internet gateway means for the extension of the mobility support communication system.

Also, the invention may easily be adapted that such during conversion advertisement is added to the transferred messages to reduce costs for the users of the mobility support communication system. This should be carried out in dependence on the message sender and message receiver and in dependence on the format of the message transferred. Here, in particular written messages such as facsimile or e-mail may be easily extended through advertisement statements.

Further advantages on use can be to forward a fax in the message centre to a fax number, e.g., a fax in a hotel, i.e. to forward messages from a message centre to a desired place, to forward voice mail to others, to fax to a computer, text-TV, digital TV, etc.

The same advantages as outlined above may be achieved through the information/media conversion method for using mobility support communication systems according to the present invention.

BRIEF DESCRIPTION OF FIGURES

Preferred embodiments of the present invention will be described with respect to the enclosed figures in which:

Fig. 1 shows the basic architecture of the message center according to the present invention;

Fig. 2 shows a schematic diagram of the message handling unit shown in Figure 1;

Fig. 3 shows a schematic diagram of the conversion switching unit shown in Figure 2;

Fig. 4 shows a typical example for a user menu provided through the terminal unit shown in Figure 1;

Fig. 5 shows a basic architecture of the mobility support communication system according to the present invention;

Fig. 6 shows the structure of the intelligent network communication system as one example of the mobility support communication system;

Fig. 7 shows the structure of the intelligent network communication system on a functional level;

Fig. 8 shows the structure of the digital cellular communication system as second example of a mobility support communication system according to the present invention;

Fig. 9 shows the extension of the intelligent network communication system to DECT networking;

Fig. 10 shows the integration of the internet into the

mobility support communication system according to the present invention;

Fig. 11 shows the intelligent network communication system according to the technical background of the invention;

Fig. 12 shows the digital cellular communication system according to the technological background of the present invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

In the following embodiments of the message center according to the present invention are explained with respect to Fig. 1-4.

As shown in Fig. 1, the message center 10 according to the present invention comprises a message handling unit 12 and an interface unit 14. Here, the message handling unit 12 is adapted to receive messages from outside, then to process these messages according to prespecified user criteria and also to store the messages thereafter. Further, there is provided an interface unit 14, adapted to receive instructions from the user of the message center and to drive different terminals available to the user of the message center. As shown in Fig. 1, typical terminals are a laptop computer, a voice telephone, a mobile telephone or a personal digital assistant PDA, a teleconference system, and a facsimile machine, respectively.

As shown in Fig. 1, the message handling unit 12 comprises a message control unit 16, a message storage unit 18, and a

message processing unit 20. Further, the interface unit 14 comprises an instruction unit 22 and a terminal unit 24. Here, the message control unit 16 in the message handling unit 12 is adapted to execute the control over the processing of messages received by and transferred through the message center 10 and also the storage of these messages in the message storage unit 18. Further, the message processing unit allows to identify message related information such as sender of message, time of sending, and further details and also to assign the messages to related subunits in the message storing unit 18.

The instruction unit 22 of the interface unit 14 is provided to receive instructions from the user of the message center 10, in particular with respect to the handling of different messages and with respect to specific conversion requests. The terminal unit 24 is provided to actually achieve a link between the message center 10 and the different end terminals used by the user of the message center, such as a laptop computer 26, a telephone 28, a mobile telephone 30, a telephone conference system 32, and a facsimile machine 34, respectively. Here, it is important to note that these end terminals are only listed as an example and not to be considered as construing a limit to the scope of the present invention.

As shown in Fig. 1, there exists a coupling between a message handling unit 12 and the interface unit 14 such that the message control unit 16 receives instructions from the user of the message center 10 via the instruction unit 22. Further, the instruction unit 22 instructs the terminal unit 24 to receive stored messages from the message storage unit 18 which are to be forwarded to the different end terminals

26 to 34. Therefore, during operation of the message center 10, handling of messages is controlled by the message control unit 16 in such a way that user defined instructions drive the control of the message control unit 16.

In the following, details of message handling unit 12 will be discussed with respect to Fig. 2.

As shown in Fig. 2, the message processing unit 20 comprises a message identification unit 36, an attribute assignment unit 38, a steering unit 40, and a conversion switching unit 42, respectively. Still further, the message storage unit 18 is divided into a plurality of storage boxes 18-1, ..., 18-N wherein messages may be stored according to different formats.

Further, as shown in Fig. 2, the message control unit 16 has direct impact on the message identification unit 36, the attribute assignment unit 38, the message storage unit 18, and the steering unit 40, respectively. The message identification unit 36 is linked to the attribute assignment unit 38 such that attributes may be assigned to different messages according to identification results. These attributes may then be used to store the messages in the different storage boxes 18-1, ..., 18-N. Here, the mapping to the different storage boxes 18-1, ..., 18-N may either be carried out directly via a link 44 or after conversion of the message in the conversion unit 42 via a link 46. To this end, the attribute assignment unit 38 and the conversion switching unit 42 are connected through a link 48. The conversion switching unit 42 is further connected to the steering unit 40 that receives and transmits messages to and from the message center 10 via a link 50. As already outlined above,

the steering unit 40 is provided to either output received messages directly via a link 52 or after processing in the message processing unit 20.

In the following, the function of the message handling unit 12 will be described in more detail. As shown in Fig. 2, the message control unit 16 controls the steering unit 40 such that messages are selectively outputted through the message handling unit 12. In particular, the point whether messages are directly outputted is decided on the basis of steering parameters. Such parameters may be the maximum number of messages that may be received from a certain address and stored in a message storage unit 18, the kind of handling of such messages such as first in first out FF, first in last out FL, last in first out LF, and last in last out LL. Also, a combination of such criteria may be considered, as well as a black list blocking even the reception of certain messages from a specific message center.

Further, the message identification unit 36 is adapted to classify a message as falling into a group comprising voice, facsimile, e-mail, data, video/music, program sound, video telephone, video conference, user profile, editing, voice band data, dBase access, unrestricted digital information. It should be noted, that this list is only to be considered as an example and does not limit the scope of the present invention. Still further, a message identification unit 36 may not only classify message received at or transmitted from the message center 10 but also be adapted to derive information on message format, message size or message sender identification that may later on be forwarded to the user of the message center 10. Another option is to identify the time

when a message was either received in the message center 10 or sent by the message sender.

Further, the attribute assignment unit 38 is adapted to mark the messages according to the information derived therefrom and to distribute the messages to the storage boxes 18-1, ..., 18-N. Here, the different storage boxes may be selected according to the different message categories identified through the message identification unit 36. The use of attributes allows the efficient and advanced management of the message storage unit 18 as messages may be handled in a very flexible and efficient manner. The reason for this is, that in case the user of the message center 10 wants to have access to different messages all being related to a specific attribute. This may be arranged using this attribute to characterize the related messages, contrary to a predefined storage scheme. This in particular holds true in case the user of the message center 10 combines different attributes such as, e.g., certain kind of message before a certain time for all messages received by the message center. As soon as the user specifies the logical context he is currently interested in using attributes the related messages may easily be provided for.

In the following, the functionality of the conversion switching unit 42 shown in Fig. 2 will be explained.

According to the present invention this conversion switching unit 42 may comprise different conversion means according to different conversion tasks, e.g., from speech to written data, from written data to speech, from e-mail to facsimile, or any other suitable combination from the list of message formats outlined above. However, the conversion switching

unit 42 is not restricted to the execution of such conversion task but also takes over the administration of these conversion tasks. In particular, according to the present invention there is considered the case where a message center 10 does not provide conversion functions necessary for all different formats but only comprises those that are most frequently used. In such a case, according to the present invention the conversion switching unit 42 is adapted to forward a related conversion task to another message center providing the required functionality. In an extreme case, according to the present invention the conversion switching unit 42 is only adapted to distribute all conversion tasks supplied thereto to other message centers 10. To the contrary, in case the conversion switching unit 42 comprises all conversion means that might be necessary no such forwarding will be necessary. Therefore, according to the present invention it is possible to achieve a user selected balancing between local and remote conversion intelligence.

As shown in Fig. 3, the conversion switching unit 42 comprises a conversion resource allocation unit 54 and a plurality of conversion kernels 56-1, ..., 56-n. Also, the conversion switching unit 42 comprises a conversion result forwarding unit 58 to forward the output of the plurality of conversion kernels 56-1 to 56-n to the unit specified in the conversion request. Here, it should be clear that the conversion resource allocating unit 54 either forwards a certain conversion task to a remote message center 10 in case a conversion kernel is not available for the specific conversion task specified in a received conversion request or otherwise selects the related conversion kernel. The output of this conversion kernel is then again forwarded to the unit specified in the conversion request through the conversion

result forwarding unit 58. Here, a typical example would be that the conversion result forwarding unit 58 outputs the conversion result to the same message center in which the conversion request has been issued. A typical case would be, that in case of a remote conversion the conversion result is forwarded backwards to the message center issuing the conversion request.

In the following, the function of the terminal unit 24 of the message center 10 shown in Fig. 1 will be described.

Here, the terminal unit 24 uses the result achieved by the message handling unit 12 descibed above, in particular, through access to the message storage unit 18. However, the terminal unit 24 according to the present invention is not restricted to the output of messages stored in the message storage unit 18 but also adds further functionality for the message center 10. The versatile terminal unit 24 makes the services much easier to handle through the usage of the message center 10. In particular, the terminal unit 24 enables an easy to use and easy to understand user interface as described in the following.

One option provided through the terminal unit 24 is voice menu guidance that enables user interaction from any telephone set 28 with DTMF capabilities. In this way, a recorded voice guides the user through different options in a hierarchy of menus, as shown in Fig. 4.

In particular, Fig. 4 shows that the terminal unit 24 supports a main menu 60 as well as sub-menus 62-1 to 62-5 with respect to the different services. According to the present invention, these menus may be adapted according to

preferences of the user of the message center. In particular, the order of the menu choices may be changed and many choices may be removed or added, respectively. Typically, voice announcement for the main menu 60 or the sub-menus 62-1 to 62-5 are specified through the service provider which in addition may influence the setting of data, e.g., the time to wait for a next digit input, the number of repetitions in case of a wrong input, etc. Typical examples for voice announcements through the main menu may be "your service profile has changed", "you have new messages", "a fax has been sent to your facsimile machine", "you have miscalled", "you have e-mail", or "you received messages from your boss".

Also, as within mobility support communication systems users of message centers are not restricted to a single place and submenus 62-2 will be provided for mobility management 62-2 to specify either one or more numbers where the user may be reached, a time-table and routing plans for roaming. Further, another sub-menu 62-3 relates to message handling and is adapted to different message formats such as voice mail, fax mail, calls, etc.. According to the present invention, there also also provided items being related to coversion resources, conversion capacity, blacklist, number selection, voice control, message attributes and steering lists, respectively. It should be noted that this list is only to be construed as explaining the present invention does not construe a limit thereto.

Typically, the subitem conversion resources is provided to enable the user to specify the different conversion kernels he wants to use or he has access to. Further, the subitem conversion capacity may be used to adapt the conversion capacity being necessary with respect to a single format. The

blacklist subitem enables the user of the inventive terminal unit 24 to block messages from a specific sender. The format selection subitem is provided to select messages according to specific format from the message storage unit 18. In addition, the voice control subitem enables an option to modify the control executed through the message control unit 16 via the instruction unit 22, as outlined above. Finally, the message attribute subitem helps the user of the message center to select all those messages from the message storing unit 18 that have assigned a specific attribute thereto. Finally, the steering list subitem enables the adaption of the control of the steering unit 40 shown in Fig. 2.

The subitem main menu allows to skip back to the main menu and pop up different sub-menus.

A further sub-menu is the status menu adapted to provide a plurality of information with respect to the status of the terminal unit 24. Also the availabiltity of different services for users of the message center 10 may be modified using the profile management sub-menu 62-4 adapted for the input of profile data such as stored numbers, abbreviation of numbers, routing plans, featured data with respect to the end terminal 26 to 34 use, and a PIN-code to identify the end user of the terminal unit 24.

The present invention further provides user interface technology enabling speech recognition as powerful compliment to the ordinary voice menu. With speech reconition the user of the message center 10 has the option to use voice and give commands to handle the services provided to him. In particular, dedicated speech recognition will translate spoken phrases into digital information sent to the

instruction unit 22 and forwarded to the message control unit 16. Such specific options require the activation of the sub-menu for feature activation, as shown in Fig. 4.

Further features are related to incall screening, user access, WWW-access and all related features. In particular, the WWW-access allows to set up in interface between the message center 10 and the internet to make use of the ever more expanding means of mobility supported communication. Here, the user of the message center can perform a set of procedures from his end terminal such as access to voice mail, registration of incoming calls, modification of predefined numbers, change of PIN-code, set up of outgoing calls, and so on. Call related features refer to either incoming or outgoing messages to be handled by the message center. Typical outgoing message features are follow-on when busy, follow-on when no reply, or last number redial. Follow-on when busy will literally turn back to the main menu when the message receiver is busy. Follow-on when no reply will return to the main menu when no answer is received within a specified number of seconds, e.g., 20 seconds. Follow-on when receiver hangs up is related to the case when the message receiver terminates the link.

As shown in Fig. 4, the sub-menu feature activation also provides message features. A typical example is incoming call which is basically the identification of the calling number. Further options are subscription check to see whether a dialed message number is valid or not, or busy/congestion announcement to suppress services at the terminating message center. A further feature is related to the calling message number valid detection to check on the validity and completeness of the calling number. Further, in case a

roaming user forgets to change the registration with the message center 10 in case he leaves his specific site a third party may change the registration status of this user. It is important to note that according to the present invention it is possible for the first time to combine the interface technology described above with the powerful conversion functionality within the message center 10.

Preferably, according to the present invention, the terminal unit 24 also provides end terminal functionality and may be realized through use of, e.g., a computing device adapted to receive the internal messages and having a display means to set up the user menu shown in Fig. 4. Also preferably, this computer means should be adapted to notify a message received in the form of, e.g., a short message service or a voice message, as outlined above. Also, it is possible to select messages from the message storing unit 18 in accordance to message volume, message sending time or message priority, respectively. In case a computing device is used as terminal unit 24 and end terminal, respectively, it may be easily integrated into the internet/WWW-structure. Also, a connection to the internet may be easily achieved using this approach.

Therefore, the end user may easily perform, activate, modify or interrogate the handling of messages and execute media/information conversion irrespective of message access, of outgoing messages, incoming messages, or general message handling. Therefore, according to the present invention the end user will always be accessible world-wide irrespective of the specific end terminal at hand for the time being. There is no restriction to the kind of traffic and services may be user controlled with efficient personal support. There is no

restriction whether the user roams in a cellular communication network, and further the conversion may be rearranged in dependence of the routing plan for the roaming end user. Since the application of the message center may be adapted in a flexible manner, it will be possible to reduce the costs that exist in case each end terminal should support any kind of media/information conversion. Still further, the end user may easily control messages remotely from any terminal and easily handle the services either with voice commands or via internet. Finally, a large number of automatic features support the user during the access to the messages.

Further advantages are that, e.g., users of end terminals being connected to message centers may be more accessible. This may be of particular importance for companies at a plurality of places working. Further, in case companies move to another location this has no impact on the communication efficiency between employees and managers and, likewise, personal working different functions may work at home or wherever they like, using the inventive flexible approach to media/information conversion. Still further, the flexible approach to the handling of messages may allow service providers to keep and attract new customers thus achieving increased traffic and revenues. Also, using the message center according to the present invention it is possible to enable service management through internet, to improve the cooperation between groups communicating with each other, to upgrade new service features, and enable personal communication services to support fixed/mobile communication and conversion as well as internet integration, respectively.

While in the above the structur and function of the message center according to the present invention has been described in detail, in the following the integration of such a message center into a mobility support communication system will be described with respect to Figures 5 to 10, respectively. Here, it should be noted that the present invention is not restricted to a particular structure of such a mobility support communication system but may be applied to any available mobility communication system, as outlined in the following.

As shown in Fig. 5, a mobility support communication system generally comprises a service management unit 64, a service control unit 66, and a service switching unit 68, respectively. The service switching unit 68 is connected to different message centers and/or intelligent peripherals or end terminals 70 by a mobile GSM-link 72, a radio in the local loop RLL-link 74 or via internet using the TCP-IP protocol 76.

As shown in Figure 5, the service control unit 66 and the service switching unit 64 usually establish a service exchange device for the mobility support communication system wherein a message is transferred from a service source node taken from the end terminals to at least one service target node also be comprised in the set of end terminals. Here, typically the message center 10 with the conversion means is either provided in the service control unit 66 or in the service switching units 68. However, the present invention is not restricted such an architecture and further message centers may also be provided in the group of end terminals 70.

As shown in Fig. 5, the functionality of the mobility support communication system with information media conversion support may be described as follows. Firstly, it is evaluated whether a service initiated in the mobility support communication system requires an information media conversion between a service source node and at least one service target node where a message is initiated and received, respectively. Then, the service exchange device, in particular the message center comprised therein, allocates conversion resources in the mobility support communication system in case such an information/media conversion is required. After the allocation step the message center will then distribute the conversion task to the allocated conversion resources in dependence on the available conversion funçtionality and capacity provided therefore. Once the conversion task is finished the requesting unit is notified the conversion result for further processing thereof. Further, it is possible to execute the conversion task not only in a single message center but also to carry out the conversion in distributed manner using a plurality of message centers in the mobility support communication system, as shown in Fig. 5 and outlined above.

In the following, typical examples for such mobility support communication systems will be explained with respect to the intelligent network communication system equivalently referred to as universal personal telecommunication system UPT, the cellular digital communication system GSM and the virtual private network VPN, respectively.

Fig. 6 shows the architecture of the intelligent network communication system on a component level. To control the switching of messages in the intelligent network

communication system, there is provided a service switching point 80. This service switching point 80 provides for service switching functions 82 shown in Fig. 6 and further specialized resource functions 84. The service switching function SSF 82 triggers calls/ messages and invokes rerouting of the calls and messages to the service control function SSF for analysis.

As shown in Fig. 6, the specialized resource function SRF subdivides into further components, i.e. intelligent peripherals IP, message centers 10 according to the present invention and gateway to audio information GAIN-units, respectively. Here, intelligent peripherals IP such as the terminal unit 24 implement specialized functions required for universal personal communication services. They are associated to service switching points 80, but they can also be controlled by common channel-signalling. Also, according to the present invention in the message center 10 messages may be stored and retrieved only by the addressed user preventing unauthorized access by any other party. The gateway audio information node GAIN provides for information services, operator support and value-added services.

Another important component of the intelligent network communication system shown in Fig. 6 is the service control point SCP and the related service data point 88. The service control point SCP handles the service profile and service logic associated with each user of the intelligent network communication system. These objects are identified through personal user interface numbers PUI equivalently being referred to as personal user identity number and the specified subscribed services and registered location data.

Further, as shown in Fig. 6, the service control point SCP 86 is also linked to a service management system SMS 90 that provides the design environment for the creation of service logic based on service independent building blocks SIB. Thus, the service management system SMS is an application system providing application programming interfaces and an infrastructure for the development of designs such as computers and basic software components. Here, according to the present invention, new conversial kernels 56-1, ..., 56-n could be provided to the different message centers 10 in the intelligent network communication system. Each software independent building block SIB contains an element as logic element and further a data element. Here, the service management system SMS allows to combine the appropriate service independent building blocks SIB, e.g. for media/information conversion to form the desired service profile for which service and data can be handled separately and conversion functionality in the message centers.

As shown in Fig. 6, the architecture of the intelligent network communication system is completed by an operator system OPS, a charging record unit TT, and a wide area paging unit WAP. Here, the operator system OPS allows for a manual assistance of a UPT service in the operator system OPS. Also, a wide area paging unit WAP is provided to handle calls and messages that require paging and thus must be routed to stand-alone wide-area paging equipment paging the user and notifying him of the incoming call and the calling party's number.

In the following the architecture of the intelligent network communication system shown in Fig. 6 will be described on a functional level with respect to Fig. 7.

As shown in Fig. 7 and outlined above, the functional architecture is based on the intelligent network concept IN which is, e.g., defined by ITU-TS in the recommendation Q.1204. The IN functional model may be divided into three logical groups, i.e. call control related functions, service control related functions, and management related functions, as outlined above. While in the following, the functional entities are only described as far as the present invention is concerned, further details may be taken from references van Hal, P., van der Meer, J. and Salah, N.: "The Service Script Interpreter, an Advanced Intelligent Network Platform", Ericsson Review 67(1990): 1, pp. 12-22, Ljungblom, F.: "A Service Management System for the Intelligent Network", Ericsson Review 67(1990): 1, pp. 32-41, and Söderberg, L.: "Architecture for Intelligent Networks", Ericsson Review 66(1989): 1, pp. 13-22.

As shown in Fig. 7, the call control agent function CCAF 92 forming part of the call control related functions provides access for users of services. This means that the call control agent function CCAF 92 establishes the interface between the user and the network call control function and is usually implemented in the terminal unit 24.

Further, a large amount of information has to be exchanged between the user and the intelligent network communication system. One example would be information being related to the access, the identification, and the authentication for a user. Existing systems do not support the conversion of the required information.

As also shown in Fig. 7, another control related function is the message call control function CCF 94 assigned to the message handling unit shown in Fig. 1 that provides call/connection processing and control in the network. In particular, the call control function CCF 94 establishes, manipulates and releases call/connection instances according to information received from the call control agent function CCAF. Further, it provides a trigger mechanism to access the IN functionality required for the UPT service, i.e. passing of events to the service switching function SSF 82 executed in the service switching point SSP, as explained above with respect to Fig. 6.

The signaling system between the call control function CCF 94 and the service switching function SSF 82 must transfer the calling line identity CLI to the service switching function SSF and further the user identity to the alerted terminal unit 24. Thus, the service switching function SSF 82 provides a set of functions needed for interaction between the source control function CCF 94 and the target control function SCF 96.

While in the above, call control related functions have been described in the following service control related functions such as information conversion will be described also with respect to Fig. 7.

The service control function SCF 96 contains the logic and processing capability required to handle the services and conversion and is implemented, e.g., using the message center according to the present invention. After a message has been triggered in the service switching function SSF 82, a request for instructions is sent from the service switching function

SSF 82 to the service control function SCF 96. Then, the service control function SCF 96 performs service and conversion control in response to the request with instructions back to the service switching function SSF 82.

Thus, the service control function SCF 96 interfaces and interacts with the service switching function SSF 82, the call control function CCF 94, the special resource function SRF 84, and the service data function SDF 88, respectively. The service data function SDF can be located in two different networks; i.e. in the originating/assisting network SDF_o and in the home network SDF_h. The service control function SCF has real time access to service data functions SDF during the execution of the service.

Further, the interface between the service control function SCF_o and the service data function SCF_h denoted with P in Fig. 7 is needed to achieve appropriate information about the user and conversion conditions. One example would be location information for the user and his service profile and conversion requirements.

The service data function SDF 88 contains a certain amount of subscriber data and network conversion data. The service data function SDF_o interfaces and interacts with the source control functions SCF 96, as outlined above, to implement conversion tasks. In particular, the service data function SDF_o stores a list of agreements that indicate the identity of all the services provided for and which subscribers are allowed to access the service in the service data function SDF_o's network.

To the contrary, the service data function SDF_h provides all

data relating to the user, e.g., location information, service profile and authentication information, conversion information and also the access control functionality to check whether conversion or other requests received from remote entities are authorized or not. Further, the management of service data functions SDF_o and SDF_h is handled through service management functions SMF_o and SMF_h, respectively.

Still further, as shown in Fig. 7, the specialized resource function SRF 84 provides the specialized resources required for the execution of the service. Examples are DTMF digit receivers, announcement machines and conference bridges to be used in the sense outlined above. The specialized resource function SRF 84 interacts and interfaces to the service control function SCF 96 and, the service switching function SSF 82 and the call control function CCF 94 is managed by a service management function SMF_o.

The last group being related to the functional architecture of the intelligent network communication system shown in Fig. 7 are management related functions.

In particular, the service creation environment function SCEF is to define, develop, test and input services into the service management function SMF 90. Output from this function can be service logic, service management logic, service data and service trigger information and conversion kernels 56-1 ..., 56-n. Further, the service management access function SMAF provides an interface between service managers and the service management function. Here, the service managers handle the service in the service management function SMF 90 through this service management access function SMAF.

A further option for the application of the inventive message center is the applcation to the cellular communication mobile network GSM already outlined with respect to Fig. 12.

Here, the service control unit 66 and the service switching unit 68 shown in Fig. 5 are realized in at least one mobile service switching center 98, as shown in Fig. 8. Further, the conversion unit 42 as described above is either implemented in the visitor location register unit VLR 100 or the home location register HLR 102. As shown in Fig. 8, this home location register HLR 102 may further be interfaced to the service control point SCP/86 of the intelligent network communication system to achieve a transparent link over borders between different mobility support communication system.

As shown in Fig. 9, the service switching point 80 may also be linked to a CCFP unit 104 for DECT networking either the service source node or the service target node. This extends the present invention to a functionality where users may use cordless terminals to be mobile within and between networks. The combination of the present invention to DECT networking offers a way for the operator to enhance the value of his investments and infrastructure and extend the transparency between different service formats. Also, communication for end users is more convenient as it is now possible to use the same terminal in different environments with corresponding information/media conversion.

Fig. 10 shows a further embodiment of the invention that is of particular interest to multimedia communication and relates to the integration of the internet into the inventive

mobility support communication system. Here, the connection between the mobility support communication network and the internet is achieved through an internet gateway 106 under control of a service administration and management system 108. Starting from intelligent network communication system platform conversion is supported in the sense outlined above via CS1 connections and the TCP-IP communication protocol. The management of the intelligent network communication system is achieved via INM management links. Further, data exchange between the service switching functions is carried out using ISUP links. Using the network configuration shown in Fig. 10, the message center 10 with the conversion functionality according to the present invention may also easily be assigned to the internet side to achieve a consistent method conversion throughout the complete network configuration.

ACRONYMS AND ABBREVIATIONS

CCAF	call control agent function
CCF	call control function
GAIN	gateway to audio information
IP	intelligent peripheral
MC	message center
OPS	operator system
P	interface
PUI	personal user identity/personal user interface number
SCEF	service creation environment function
SCF	service control function
SCP	service control point
SDF	service data function
SDP	service data point
SIB	service independent building block
SMAF	service management access function
SMF	service management function
SMS	service management system
SRF	special resource function
SSF	service switching function
SSP	service switching point
WAP	wide-area paging unit
-h	home
-o	originating
-:	traffic related signaling
---:	operation and maintenance related signalling

Claims

1. Message center, in particular for use in a mobility support communication system, comprising:

   a) message handling means (12) adapted to handle messages transferred to and from the message center, respectively,

   b) interface means (14) to receive message instructions via a terminal means (24) for the handling of messages in the message handling means (12); wherein

   c) the message handling means (12) comprises conversion means (42) for information/media conversion executed on messages transmitted to and from the message center, respectively.

2. Message center according to 1, characterized in that the conversion means (42) comprises a conversion switching means (42) to split the conversion of messages into local conversion and remote conversion executed externally to the message center.

3. Message center according to claim 1 or 2, characterized in that the conversion means (42) further comprises at least one conversion kernel means (56-1, ..., 56-n) to convert an input data format into an output data format and a conversion resource allocation means (54) to assign the input message to the correct conversion kernel means (56-1, ..., 56-n).

4. Message center according to claim 2 or 3, characterized in that the conversion means (42) assigns extra conversion resources depending on what interface means (14) is used at a moment.

5. Message center according to one of the claims 1 to 4, characterized in that the conversion means (42) is adapted to convert one format selected from a group of voice, facsimile, email, data, videoslash music, program sound, video telephone, video conference, user profile editing, voiceband data, dBase access, and unrestricted digital information, respectively, into a different format selected from the group.

6. Message center according to one of the claims 1 to 5, characterized in that the meassage handling means (12) comprises:

a) message processing means (20) to classify and modify messages transferred to and from the message center, respectively,

b) message storage means (18) to intermittently store messages in the message handling means (12), and

c) message control means (16) to control the interaction of the message processing means (12) and the message storage means (18).

7. Message center according to claim 6, characterized in that the message processing means (12) classifies the messages transmitted to the message center into a first group being directly forwarded to the interface

means (14) and a second group being intermittently stored in the message storage means (18).

8. Message center according to claim 6 or 7, characterized in that the message processing means (12) is adapted to derive information on message format, size, or message sender identification that may be output through the interface means (14) or forwarded to further message centers.

9. Message center according to one of the claims 6 to 8, characterized in that the message processing means (12) is adapted to identify the time when a message received by the message center was sent.

10. Message center according to one of the claims 6 to 9, characterized in that the message processing means (12) forwards a notification to the interface means (14) that a message has been delivered to the message center.

11. Message center according to one of the claims 6 to 10, characterized in that the message processing means (12) is adapted to stop incoming messages in dependence on the message sender identified through the message processing means (12).

12. Message center according to one of the claims 6 to 11, characterized in that the message processing means (12) identifies the format of incoming data, puts flags on different formats and distributes the different messages to storage boxes according to the flags set.

13. Message center according to one of the claims 6 to 12, characterized in that the message storage means (18) is adapted to store messages in different storage boxes (18-1, ..., 18-N) according to the message format.

14. Message center according to claim 13, characterized in that the storage boxes (18-1, ..., 18-N) comprise at least one format selected from a group of voice, facsimile, email, data, videoslash music, program sound, video telephone, video conference, user profile editing, voiceband data, dBase access, an unrestricted digital information, respectively.

15. Message center according to claim 13 or 14, characterized in that before messages are stored in the storage boxes (18-1, ..., 18-N) they are assigned an attribute through an attribute assignment means (38) according to the message format.

16. Message center according to claim 15, characterized in that each message is reassigned an attribute in the attribute assignment means (18) after execution of conversion through the conversion means (42).

17. Message center according to claim 15 or 16, characterized in that the attribute assignment means (38) marks messages according to arrival time, storage time, message sender, message format, and message size, respectively.

18. Message center according to one of the claims 1 to 17, characterized in that the interface means (14) comprises a terminal means (24) linked to the message storage

means (18) to selectively output messages to suitable terminal means (24).

19. Message center according to claim 18, characterized in that the terminal means (24) provides voice control means to react to voice to skip, store, forward, or get respective messages from the message storing means (18).

20. Message center according to claim 18 or 19, characterized in that the message instruction may be manipulated via phone using DTMF, voice, and WWW respectively.

21. Message center according to one of the claims 18 to 20, characterized in that the interface means (14) outputs a notifcation according to a message receipt in the form of a short message service.

22. Message center according to one of the claims 18 to 21, characterized in that the interface means (14) outputs a notifcation according to a message receipt in the form of a voice machine message.

23. Message center according to one of the claims 18 to 22, characterized in that the interface means (14) selects messages from the message storage means (18) in accordance to message volume, message sending time, or message priority, respectively.

24. Message center according to one of the claims 1 to 23, characterized in that it is realized using a computing means adapted to receive external messages and having

interface means enabling a setup of a user menue via a display means.

25. Message center according to claim 24, characterized in that the computing means is a server means of an intranet communication system.

26. Service exchange device for a mobility support communication system, comprising:

a) at least one service control means (66) to control at least one service activated in the mobility support communication system in response to a service request received from a service source node; and

b) at least one service switching means (68) to interface the service control means (68) to the service source node and at least one service target node; wherein

c) information/media conversion processing between the service source node and the service target node is distributed through the service control means (66) to at least one conversion means (42) provided in the mobility support communication system.

27. Service exchange device according to claim 26, characterized in that the conversion means (42) is provided in the service control means (66).

28. Service exchange device according to claim 26 or 27, characterized in that the conversion means (42) is provided in the service switching means (68).

29. Service exchange device according to one of the claims 26 to 28, characterized in that the conversion means (42) is provided in one or more of the message centers (10) of the mobility support communication system.

30. Service exchange device according to one of the claims 26 to 29, characterized in that the conversion means (42) comprises at least one conversion kernel means (56-1, ..., 56-n) to transfer an input data format to an output data format and a conversion resource allocation means (54) to forward a message to be converted to the correct conversion kernel means (56-1, ..., 56-n).

31. Service exchange device according to claim 30, characterized in that the conversion means (42) further comprises a conversion notification means (58) to forward output data of the conversion kernel means (56-1, ..., 56-n) to the target message center (10).

32. Service exchange device according to one of the claims 26 to 31, characterized in that the mobility support communication system is an intelligent network communication system (IN,UPT), the service control means is the service control point (SCP) of the intelligent network communication system (UPT), and that the service switching means is the service switching point (SSP) of the intelligent network communication system (IN,UPT).

33. Service exchange device according to claim 32, characterized in that the service source node and the service target node are intelligent peripherals (IP) of the intelligent network communication system (UPT) provided with the conversion means (42).

34. Service exchange device according to one of the claims 26 to 31, characterized in that the mobility support communication system is implemented as cellular digital communication system (GSM) and that the service control means (66) and the service switching means (68) are realized in at least one mobile service switching center (MSC) of the cellular digital communication system (GSM).

35. Service exchange device according to claim 34, characterized in that the conversion means (42) is realized in one of the visitor location register means (VLR) and the home location register means (HLR) of the digital cellular communication system (GSM), respectively.

36. Service exchange device according to claim 35, characterized in that the home location register means (HLR) is further interfaced to a service control point (SSP) of an intelligent network communication system (IN,UPT).

37. Service exchange device according to claim 36, characterized in that the service switching means (SSP) is also linked to CCFP-means for DECT networking of either one of the service source node and the service target node, respectively.

38. Service exchange device according to claim 36 or 37, characterized in that the service control means (66) also interfaces to an internet gateway means (106) to extend the mobility support communication system to World Wide Web (WWW).

39. Information/media conversion method for use in a mobility support communication system, comprising the steps:

a) evaluating whether a service initiated in the mobility support communication system requires an information/media-conversion between the service source node and the at least one service target node;

b) allocating conversion resources in the mobility support communication system in case an information/media conversion is required; and

c) distributing the conversion task to the allocated conversion resources in dependence on a conversion functionality and capacity provided thereby and notifying the service target node about the result of the media/information conversion.

FIG.1

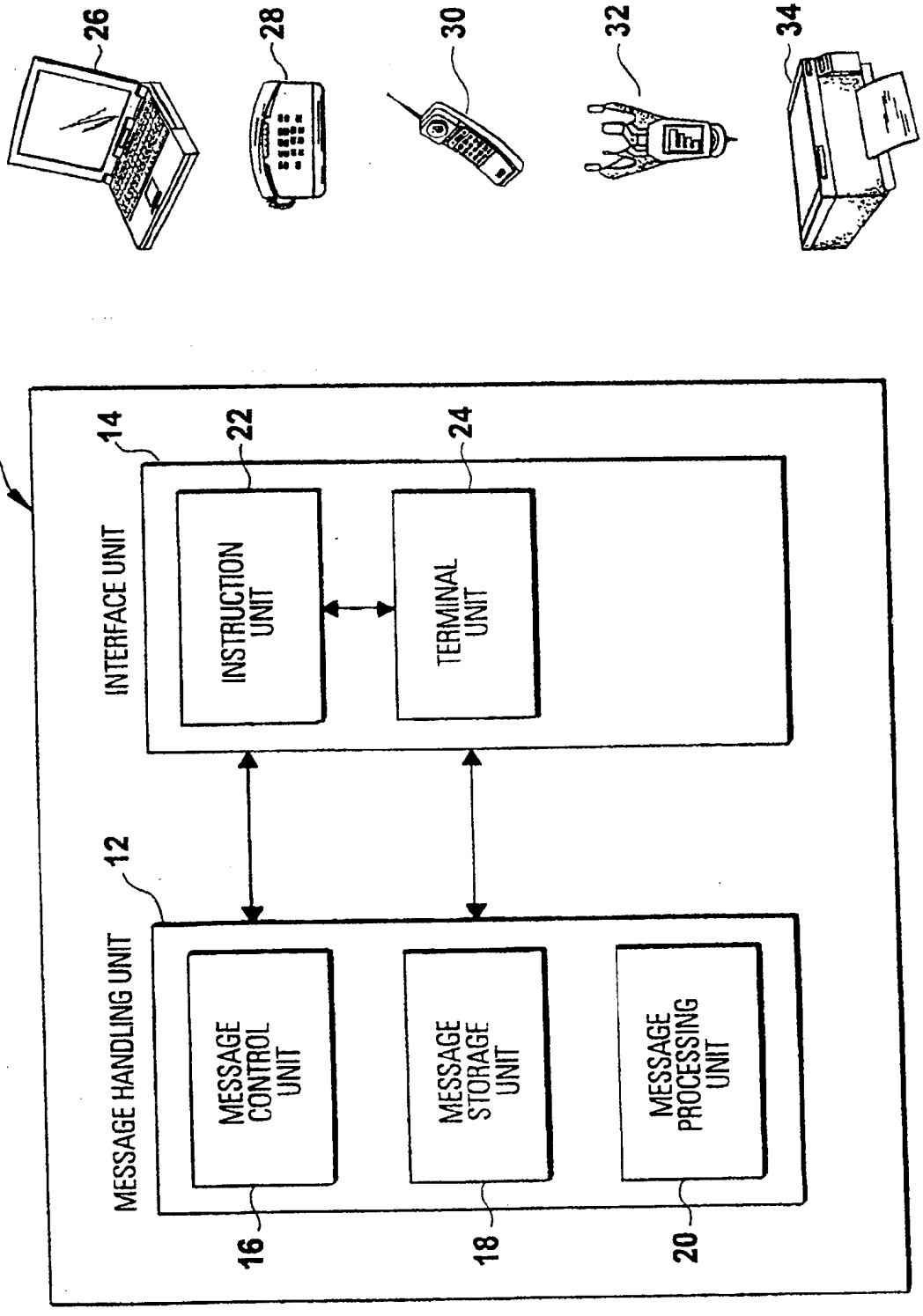

10
14
22
24
INTERFACE UNIT
INSTRUCTION UNIT
TERMINAL UNIT
12
MESSAGE HANDLING UNIT
MESSAGE CONTROL UNIT
MESSAGE STORAGE UNIT
MESSAGE PROCESSING UNIT
16
18
20
26
28
30
32
34

FIG.2

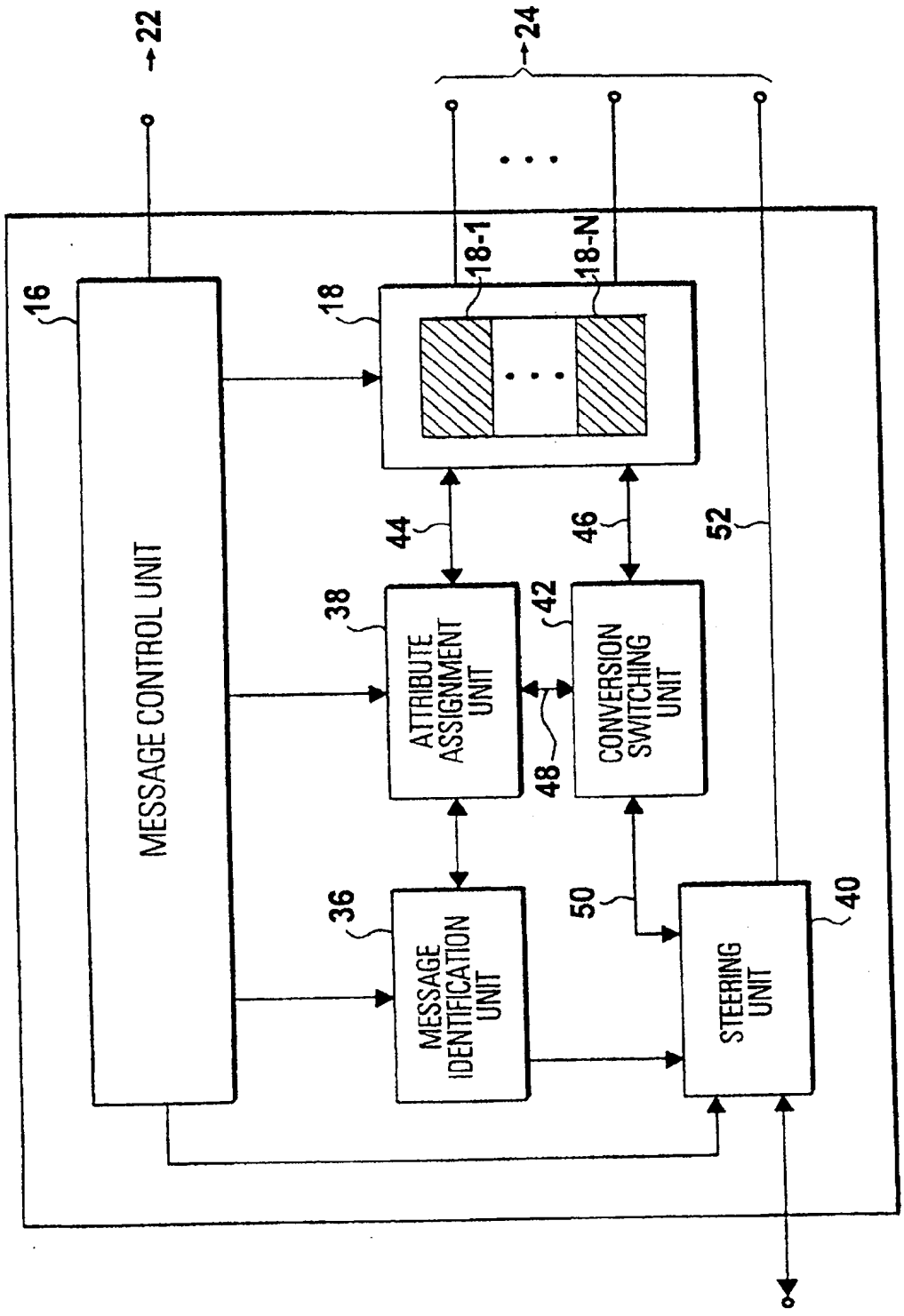

22
24
16
18
18-1
18-N
MESSAGE CONTROL UNIT
44
46
52
38
42
ATTRIBUTE ASSIGNMENT UNIT
CONVERSION SWITCHING UNIT
48
36
50
40
MESSAGE IDENTIFICATION UNIT
STEERING UNIT

FIG.3

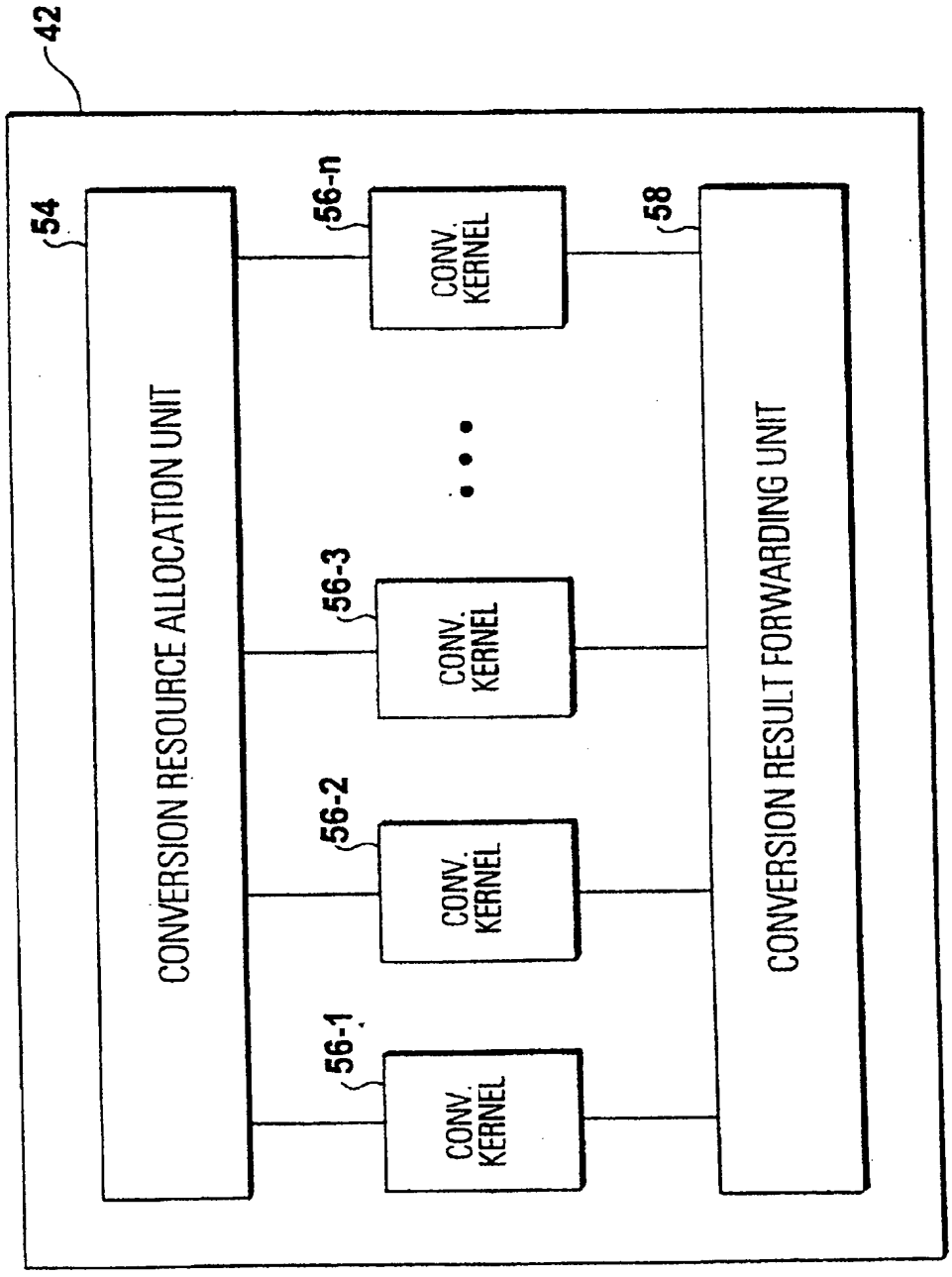

42
54
CONVERSION RESOURCE ALLOCATION UNIT
56-n
CONV. KERNEL
56-3
CONV. KERNEL
56-2
CONV. KERNEL
56-1
CONV. KERNEL
58
CONVERSION RESULT FORWARDING UNIT

FIG.4

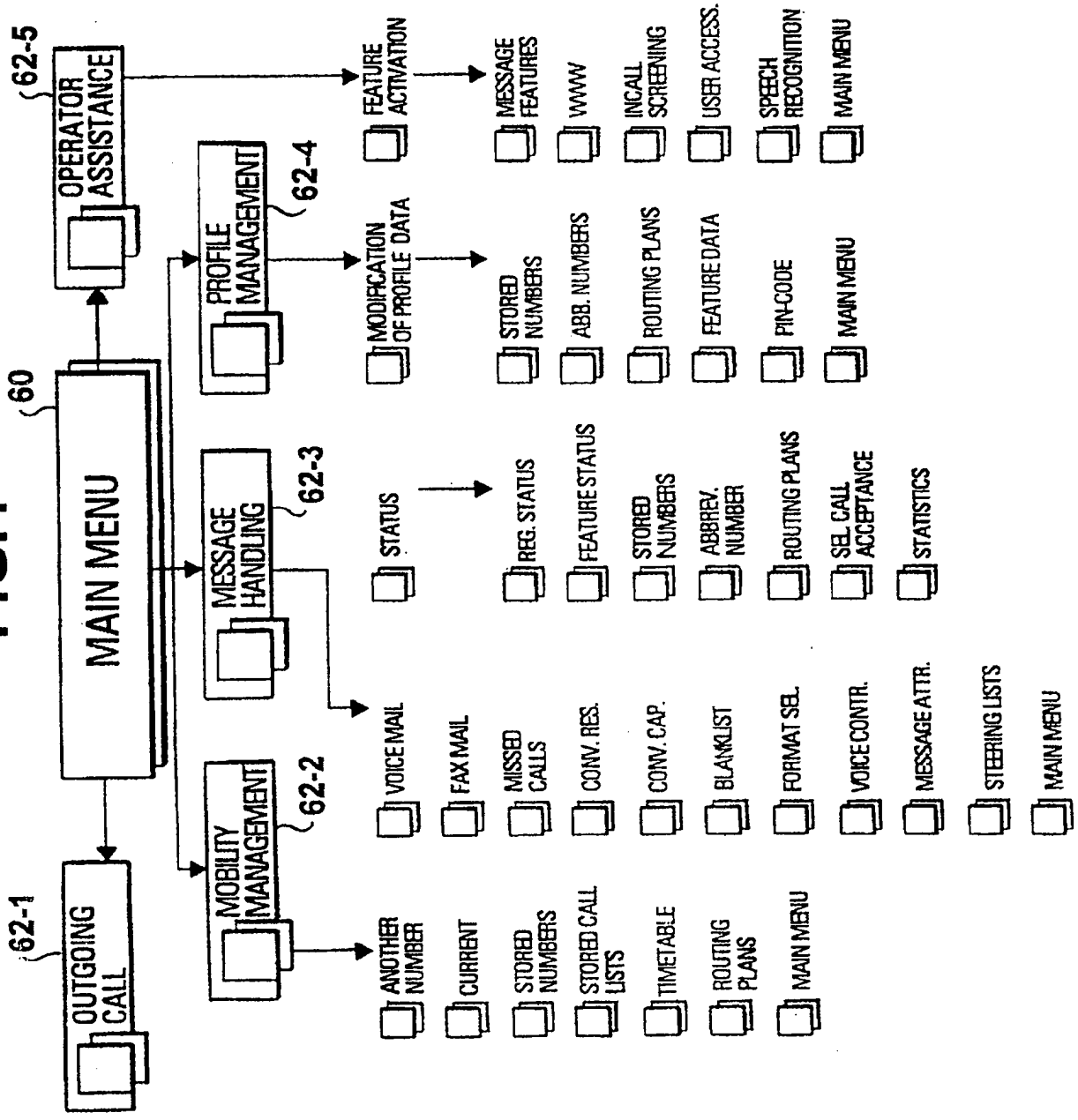

MAIN MENU
60
OUTGOING CALL
62-1
MOBILITY MANAGEMENT
62-2
MESSAGE HANDLING
62-3
PROFILE MANAGEMENT
62-4
OPERATOR ASSISTANCE
62-5
ANOTHER NUMBER
CURRENT
STORED NUMBERS
STORED CALL LISTS
TIMETABLE
ROUTING PLANS
MAIN MENU
VOICE MAIL
FAX MAIL
MISSED CALLS
CONV. RES.
CONV. CAP.
BLANKLIST
FORMAT SEL.
VOICE CONTR.
MESSAGE ATTR.
STEERING LISTS
MAIN MENU
STATUS
REG. STATUS
FEATURE STATUS
STORED NUMBERS
ABBREV. NUMBER
ROUTING PLANS
SEL. CALL ACCEPTANCE
STATISTICS
MODIFICATION OF PROFILE DATA
STORED NUMBERS
ABB. NUMBERS
ROUTING PLANS
FEATURE DATA
PIN-CODE
MAIN MENU
FEATURE ACTIVATION
MESSAGE FEATURES
WWW
INCALL SCREENING
USER ACCESS
SPEECH RECOGNITION
MAIN MENU

FIG.5

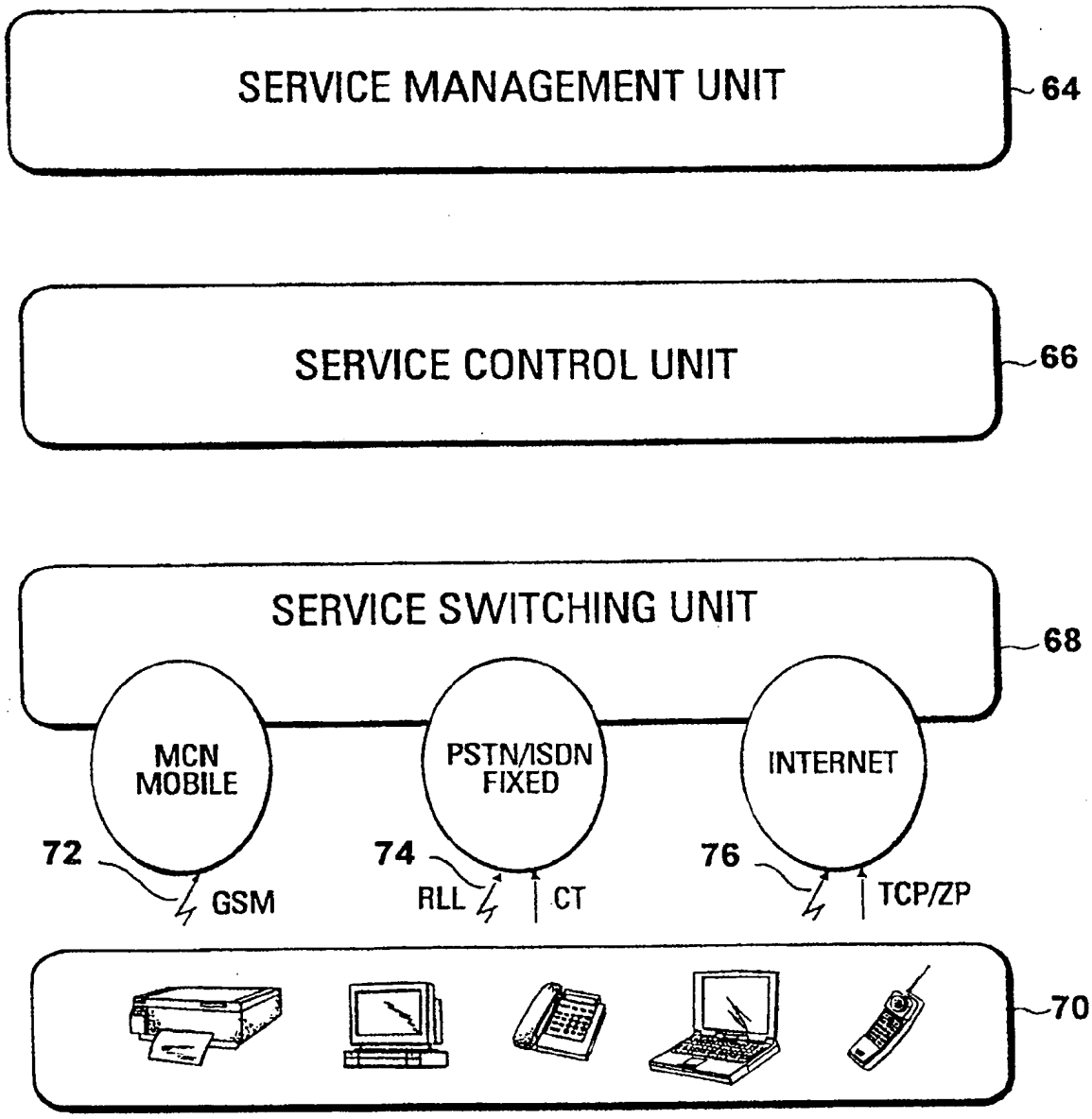

SERVICE MANAGEMENT UNIT
64
SERVICE CONTROL UNIT
66
SERVICE SWITCHING UNIT
68
MCN MOBILE
PSTN/ISDN FIXED
INTERNET
72
GSM
74
RLL
CT
76
TCP/ZP
70

FIG.6

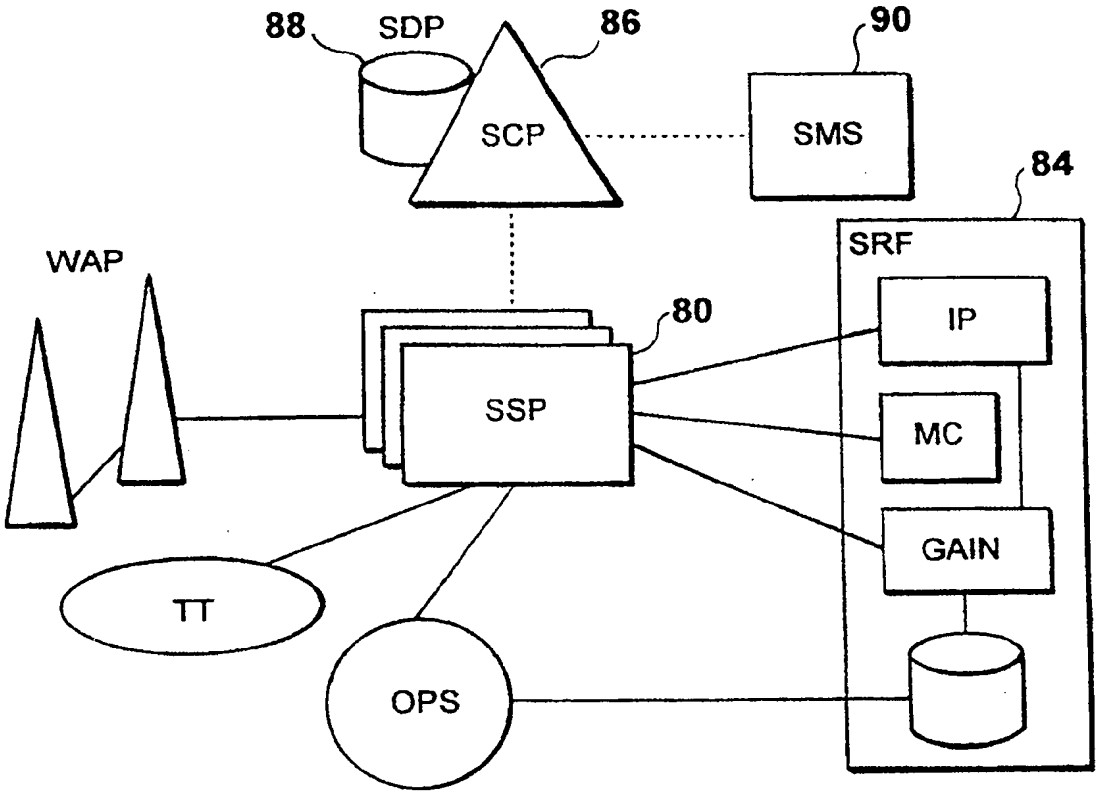


FIG.7

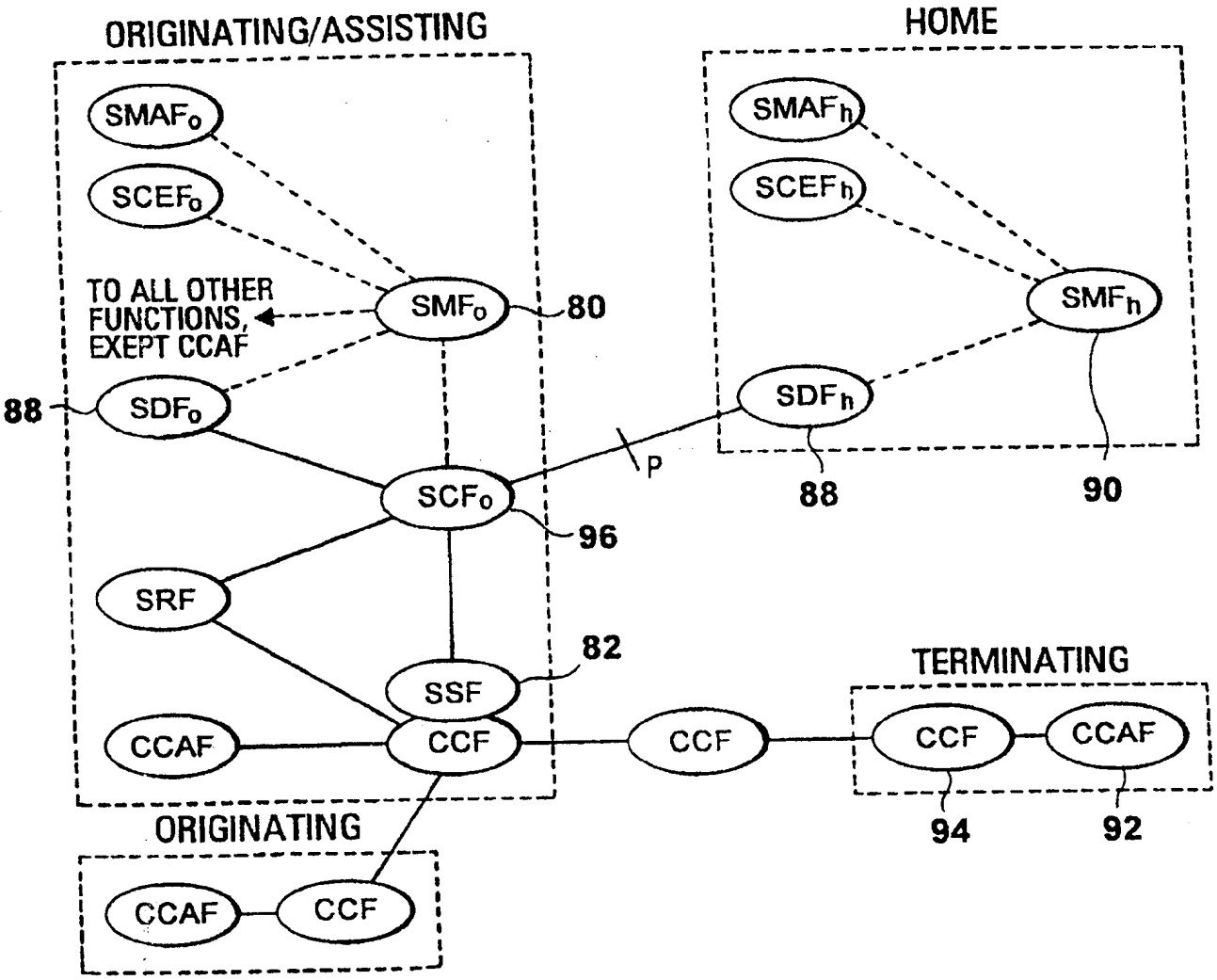
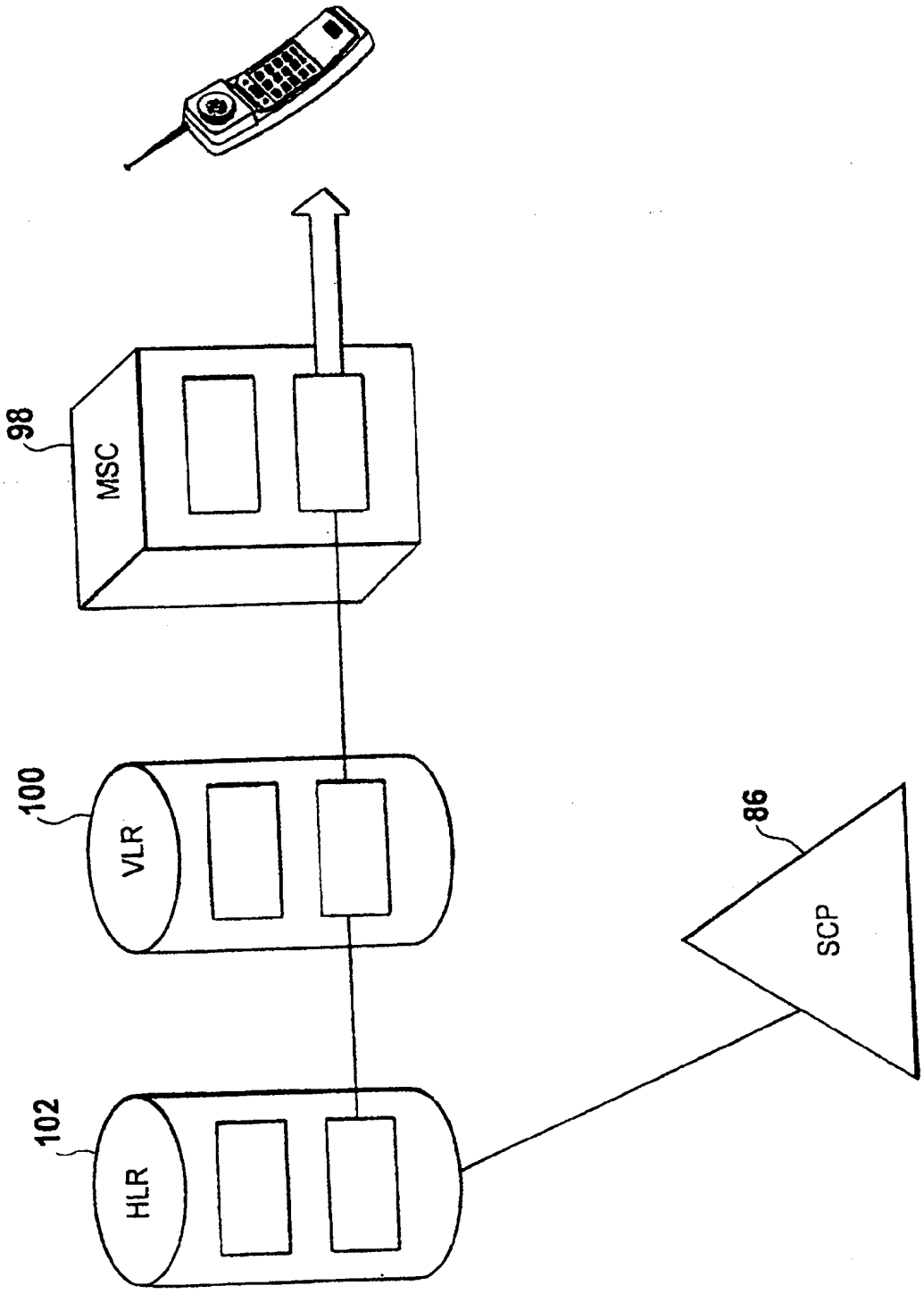

ORIGINATING/ASSISTING
HOME
SMAFo
SCEFo
TO ALL OTHER FUNCTIONS, EXEPT CCAF
SMFo
80
88
SDFo
SCFo
96
SRF
82
SSF
CCAF
CCF
CCF
CCF
CCAF
TERMINATING
ORIGINATING
CCAF
CCF
SMAFh
SCEFh
SMFh
SDFh
P
88
90
94
92

FIG.8



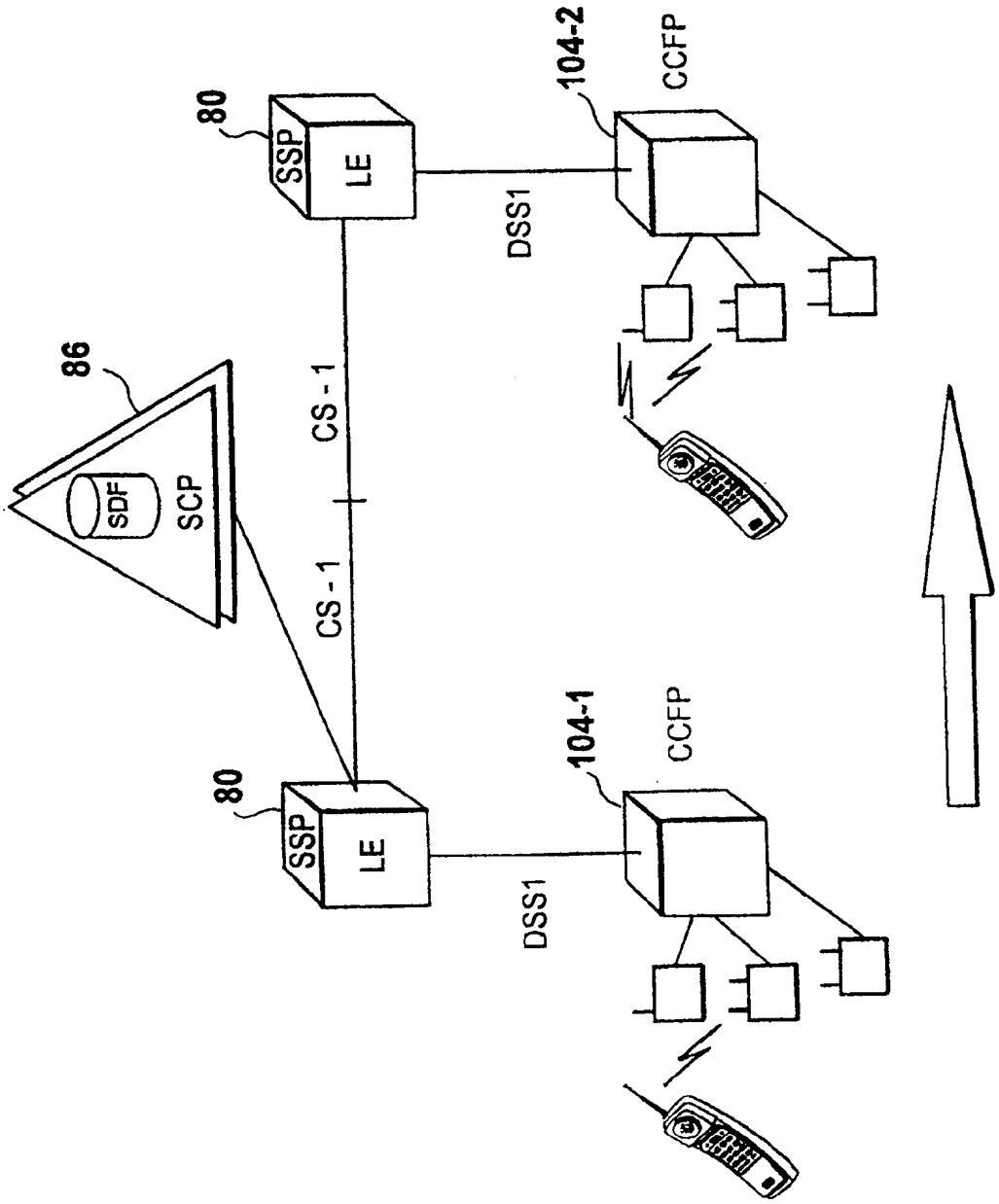

80
SSP
LE
104-2
CCFP
DSS1
86
SDF
SCP
CS - 1
CS - 1
80
SSP
LE
104-1
CCFP
DSS1

FIG.9

FIG.10

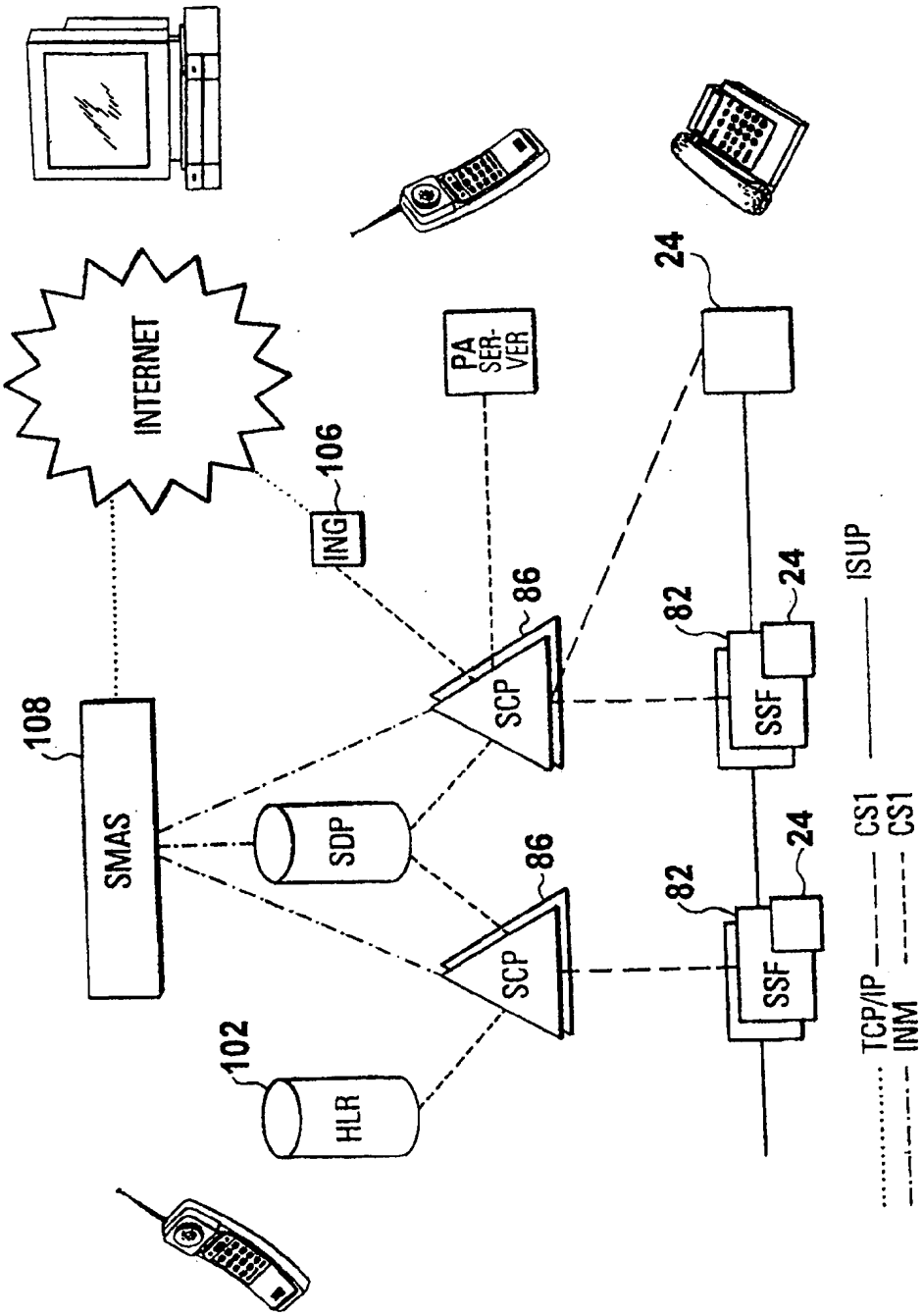

INTERNET
PA SER-VER
ING
106
24
86
SCP
82
SSF
ISUP
108
SMAS
SDP
CS1
CS1
TCP/IP
INM
102
HLR

FIG.11

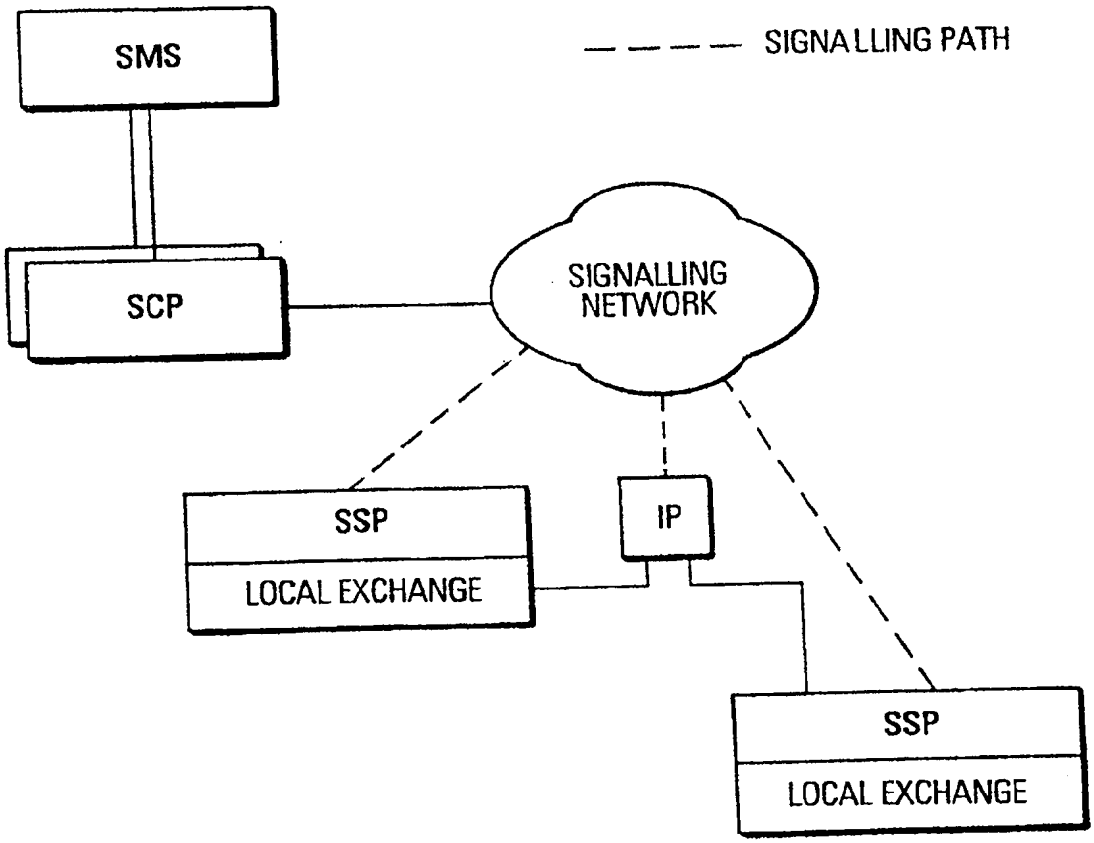
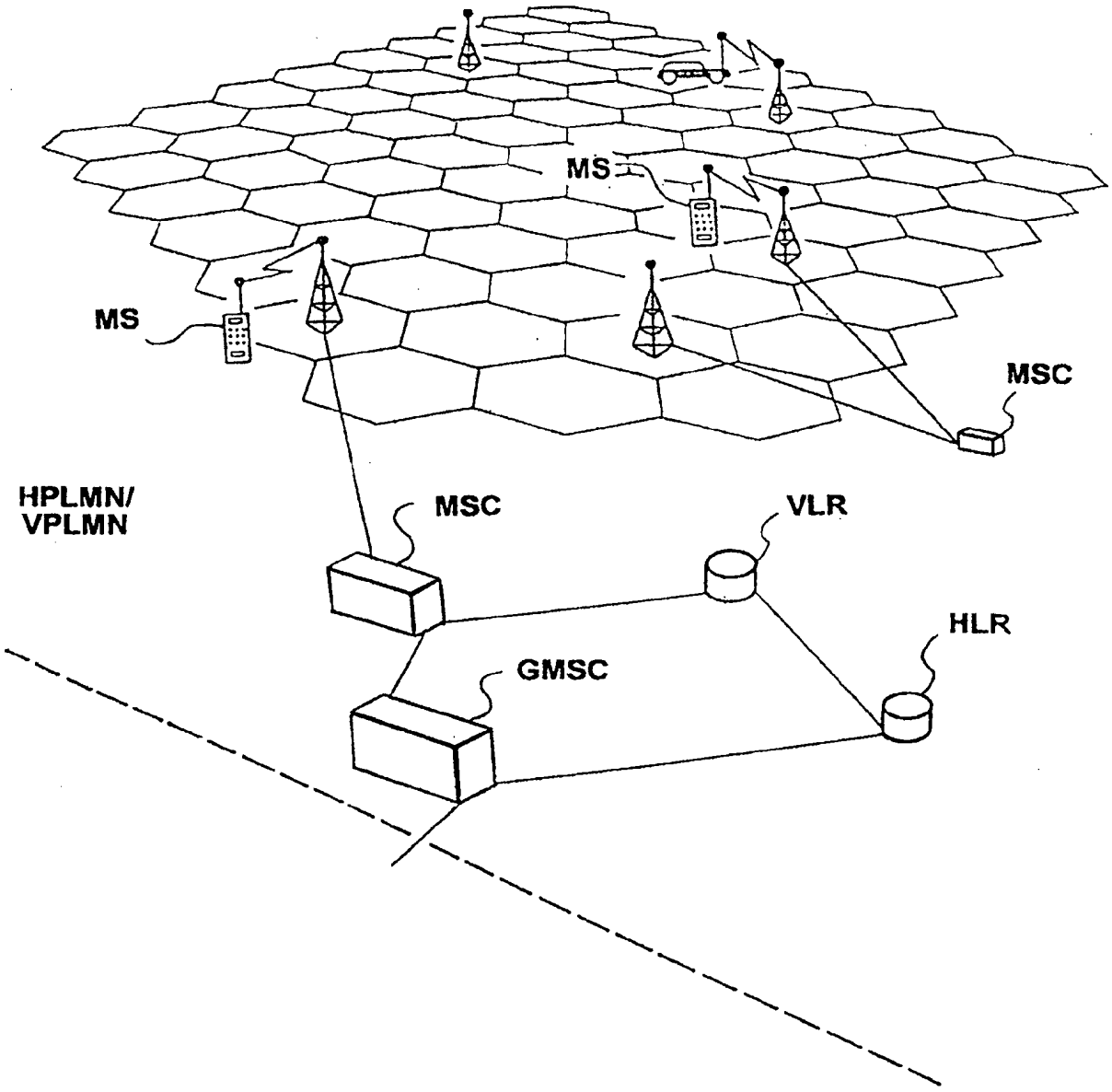

SMS
SIGNALLING PATH
SCP
SIGNALLING NETWORK
SSP
LOCAL EXCHANGE
IP
SSP
LOCAL EXCHANGE

FIG.12



INTERNATIONAL SEARCH REPORT

Int tional Application No
PCT/EP 99/00309

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04L29/06 H04L12/58 H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 782 304 A (AT & T CORP) 2 July 1997	1,5,6, 8-10,13, 14,18, 24, 26-29,39
A	see column 3, line 9 - column 15, line 5	2,3,7, 12,15, 19-23, 25, 30-32, 34,38
A	WO 97 33413 A (BRITISH TELECOMM ;STOCKTON TOBY JAMES (GB)) 12 September 1997 see page 3, line 31 - page 10, line 23	1,5,6,9, 10,18, 24-29, 32,33,39

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
26 May 1999	07/06/1999

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Maalismaa, J

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		CA 2192501 A	30-06-1997
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